

a third semiconductor layer, which is provided on the second semiconductor layer and has a larger band gap than the second semiconductor layer;

wherein the semiconductor device functions as a heterojunction bipolar transistor in which at least a portion of the first semiconductor layer is a collector region including first conductive-type impurities; at least a portion of the second semiconductor layer is a base region including second conductive-type impurities; and at least a portion of the third semiconductor layer is an emitter region including the first conductive-type impurities;

wherein the second semiconductor layer comprises a graded composition layer having a composition in which the band gap becomes larger in a direction from the collector region toward the emitter region, and an upper layer having a composition in which the band gap change ratio is smaller than the band gap change ratio of the graded composition layer;

a band gap in the upper layer of the second semiconductor layer decreases gradually in a direction from the emitter region toward the collector region, and the impurity concentration in the upper layer is substantially constant, and

an emitter-base junction is formed in the upper layer of the second semiconductor layer.

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5. (Amended) The semiconductor device according to claim 1, wherein

the second semiconductor layer is a SiGe layer;

the third semiconductor layer is a Si layer; and

the Ge content in the upper layer of the second semiconductor layer changes not more than 4%.

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A3  
9. (Amended) The semiconductor device according to claim 1, wherein the impurity concentration in the graded composition layer of the second semiconductor layer decreases as the band gap increases in the direction from the collector region toward to the emitter region.

A4  
11. (New) The semiconductor device according to claim 1, wherein  
the second semiconductor layer is a SiGe layer;  
the Ge content in the upper layer of the second semiconductor layer is not constant, and gradually increases in the direction from the emitter region toward the collector region; and  
the Ge content in the graded composition layer of the second semiconductor layer increases in the direction from the collector region toward the emitter region.